ARITHMETIC
IN
GENERAL READING

A Study made by
Balmain Teachers' College Students
in April, 1949

Edited by R. J. Gillings

BROCHURE No. 1.

Arithmetic in General Reading

A study was made in America in 1924 by Franklin Bobbitt[1] of the arithmetical terms, phrases and references which occur in the general reading of an ordinary citizen. A further study was made later in Boston, by a class of University students in 1926[2]. In that study, eleven of the principal American newspapers were chosen, and each of the eleven students of the class took one newspaper, which was examined for any reference to numbers, mathematical terms or operations. Their findings were summarised briefly under the following headings.

1. Dates.
2. Addresses.
3. Phone Numbers.
4. Numerals.
5. Roman Numerals.
6. Simple Ratio.
7. Percentages.
8. Decimals.
9. U.S. Money.
10. Foreign Money.
11. Fractions.
12. Denominate Numbers.
13. Business Terms.
14. Mathematical Expressions.
15. Graphs.
16. Problems.
17. Higher Mathematics.

The papers examined included such papers as the "New York Times," "Detroit Free Press," "Popular Mechanics," "Saturday Evening Post," "Chicago Tribune," "Christian Science Monitor," etc., etc. The detailed results may be found in "Teaching the New Arithmetic," Wilson, Stone and Dalrymple, pp. 20-29. In brief, however, they show the following:

	Frequency.
1. Dates	7,888
2. Addresses	9,249
3. Telephone Numbers	4,874
4. Numerals	100,555
5. Roman Numerals	57
6. Simple Ratio	96
7. Percentages	1,342
8. Decimals	2,721
9. U.S. Money	18,974
10. Foreign Money	88
11. Fractions	16,914
12. Denominate Numbers	8,179
13. Business Terms	1,331
14. Mathematical Expressions	42
15. Graphs	4
16. Problems	0
17. Higher Mathematics	0

Of the Roman numerals, 40 (of the 57), were less than XX, and of the 2,721 decimals, 1,222 represented numbers of two decimal places. Of the 16,914 references to fractions, 16,719 or approximately 98% were of halves, quarters and eighths. The remaining two per cent. were various, but it is interesting to note that fractions involving tenths represented only .4% of the total number[3]. The two groups, of Business Terms and Mathematical Expressions appeared to merge into one another, and contained for example words like "cash," "interest," "average," in the first group, and "dividend," "no extra charge," "stock exchange," in the second.

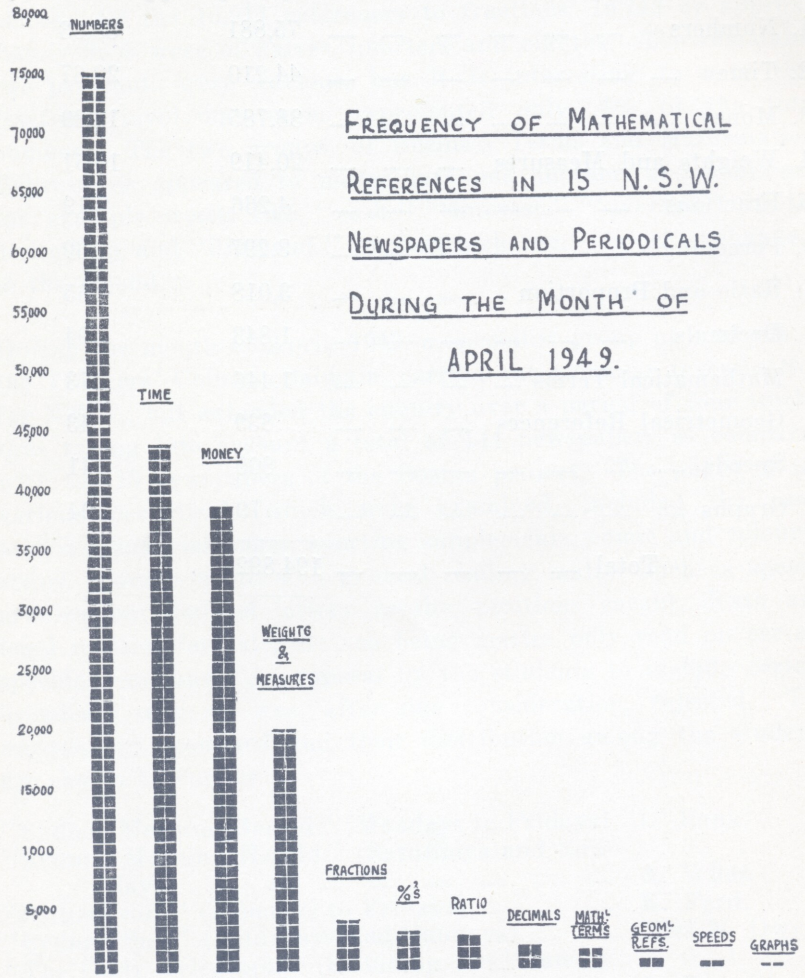
During the month of April, 1949, a specialist group of students at the Teachers' College, Balmain, carried out a similar investigation for N.S.W., but extended the enquiry over a period of four weeks, thus taking into account a total of 144 newspapers as compared with the 15 newspapers of the Boston project. The pages of the various periodicals which were examined, included the news sections, financial pages, sporting supplements, comic and coloured strips, advertisements and general reading matter such as special articles, but omitted lottery results, positions vacant, death and legal notices, for sale, etc., as being matter only read on certain specific occasions. A proposal by the students to include certain broadcast sessions, was, after due consideration, rejected. The newspapers examined and their distribution among the students are shown hereunder:

"Sydney Morning Herald" (Mondays to Fridays)	L. Rank.
"Sydney Morning Herald" (Saturdays and Sundays)	A. Wiles.
"Sydney Sun" (Mondays to Fridays)	K. Ford.
"Sydney Sun" (Saturdays and Sundays)	Miss N. Dwyer.
"The Daily Telegraph" (including the "Sunday Telegraph)	R. Bennett.
"The Mirror (Mondays to Fridays)	K. O'Keefe.
"The Mirror" (Saturdays), "The Truth" (Sundays)	K. Long.
"Smith's Weekly"	Miss L. Jonsson.
"The World's News"	E. Woodhart.
"The Bulletin"	T. Donnelly.
"The Women's Weekly"	Miss A. Hill.
"Woman"	Miss M. Fraser.
"The A.B.C. Weekly"	Miss P. Archer.
"Home"	Miss M. Byrnes.
"Pix"	M. Rowsell.

The findings are summarised as follow under 12 headings:

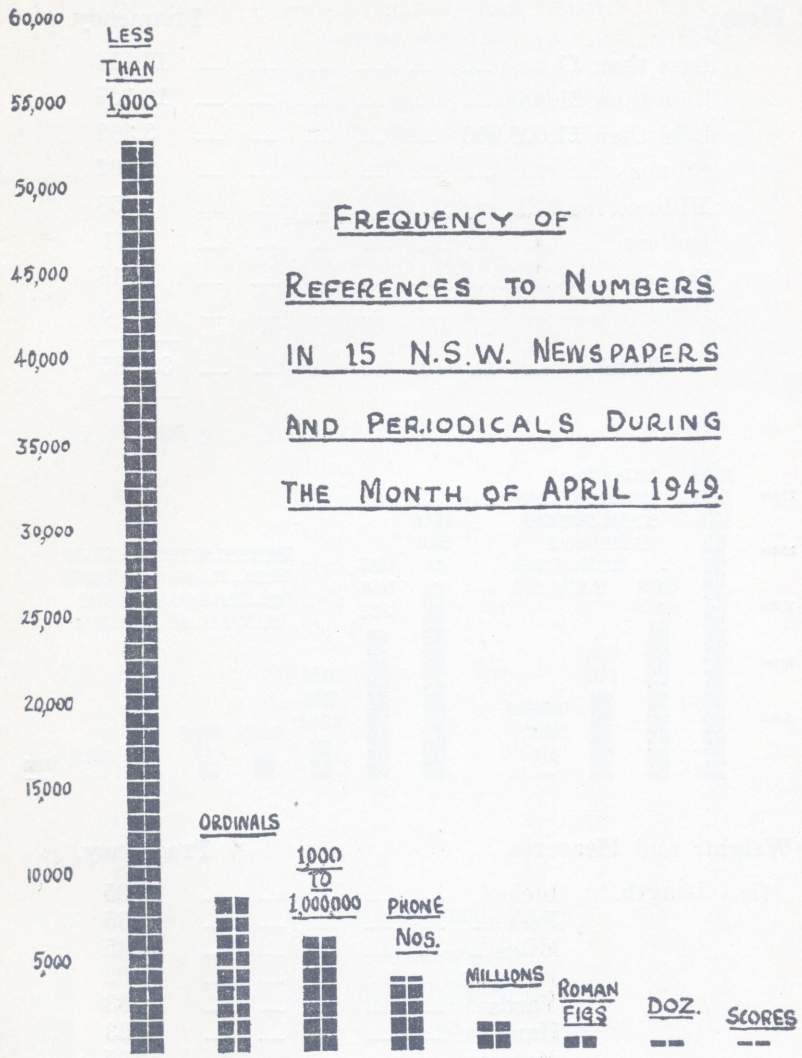
	Frequency.	Approximate %
1. Numbers	75,881	38.93
2. Time	44,210	22.67
3. Money	38,785	19.89
4. Weights and Measures	20,419	10.51
5. Fractions	4,266	2.19
6. Percentages	3,297	1.69
7. Ratio and Proportion	3,018	1.55
8. Decimals	1,843	.94
9. Mathematical Terms	1,446	.73
10. Geometrical References	839	.43
11. Speeds	809	.41
12. Graphs	79	.04
Total	194,892	

It was not found necessary to include the headings Problems or Higher Mathematics as no references to either of these were found.



1. **Numbers.**

	Frequency.
Less than 1,000	53,303
Ordinal numbers, as 1st, 2nd, etc.	9,026
Between 1,000 and 1,000,000	6,891
Telephone numbers	4,275
Millions, as 2½ millions, etc.	1,464
Roman Figures, less than XX	426
Roman Figures, over XX	93
Dozen	385
Score	18
Total	75,881

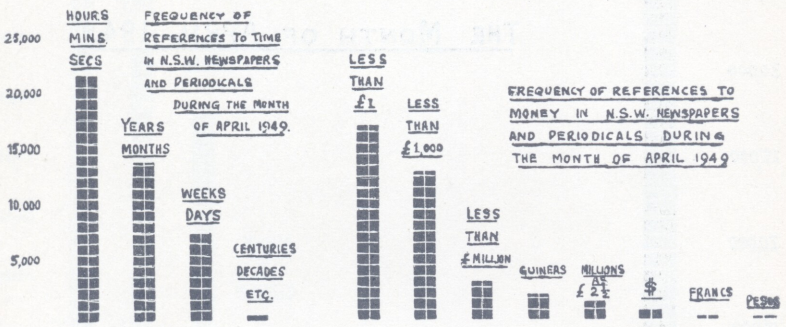


2. **Time.**

	Frequency.
Hours, minutes, seconds	22,072
Years, months	14,224
Weeks, days	7,805
Centuries, decades, eras, etc	109
Total	44,210

3. **Money.**

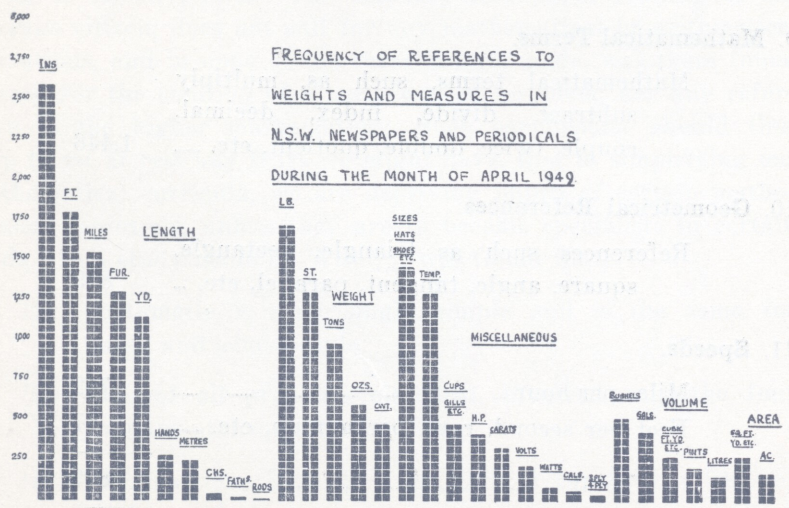
	Frequency.
Less than £1	17,714
Less than £1,000	13,107
Less than £1,000,000	3,309
Guineas	2,002
Millions, as £2½, etc.	1,658
Dollars	971
Francs	16
Pesos	8
Total	38,785



4. **Weights and Measures.**

		Frequency.	
(i) **Length.**	Inches	2,605	
	Feet	1,835	
	Miles	1,545	
	Furlongs	1,302	
	Yards	1,163	
	Hands	223	
	Metres	195	
	Chains	25	
	Fathoms	7	
	Rods	2	
			8,908
(ii) **Weight.**	Pounds	1,735	
	Stones	1,297	
	Tons	977	
	Ounces and fluid ozs.	598	
	Hundredweights	472	
			5,079

(iii) **General.**	Sizes of shoes, hats, shirts, gloves, etc.	1,461	
	Degrees of Temperature	1,312	
	Recipes, cups, spoonsful, gills, etc.	473	
	Horse Powers	412	
	Carats, gold, etc.	339	
	Volts	217	
	Watts and Kilowatts	69	
	Calories	67	
	3-ply, 4-ply, etc.	34	
	Ergs.	3	
			4,387
(iv) **Capacity.**	Bushels	512	
	Gallons	435	
	Cubic yds., ft., ins., cm., etc.	271	
	Pints	219	
	Litres	153	
	Bales	2	
			1,592
(v) **Area.**	Square yds., ft., ins., etc.	290	
	Acres	169	
			459
Total			20,419



5. **Fractions.**	**Frequency.**
$\frac{1}{2}$	2,335
$\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$	1,445
$\frac{1}{3}$, $\frac{2}{3}$, 1/10th, and others	486
Total	4,266

6. **Percentages.**	**Frequency.**
Less than 20%	1,564
More than 20%	1,287
100%	446
Total	3,297

7. **Ratio and Proportion.**	**Frequency.**
Ratio, proportion, variation odds, etc.	3,018

8. **Decimals.**	**Frequency.**
Two decimal places as .25, etc.	998
One decimal place .7, etc.	692
Three decimal places as .125, etc.	153
Total	1,843

9. **Mathematical Terms.**

Mathematical terms, such as, multiply subtract, divide, index, decimal, couple, twice, double, quotient, etc.	1,446

10. **Geometrical References.**

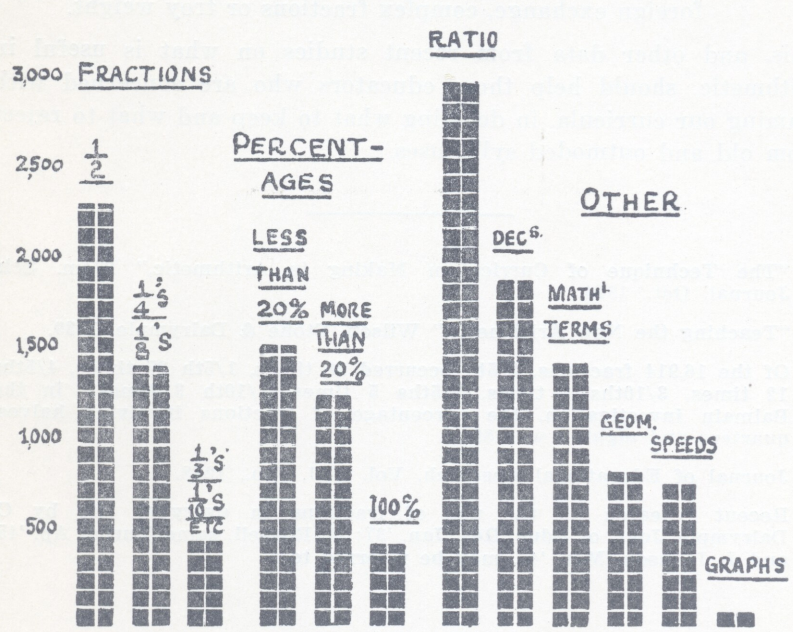
References such as triangle, rectangle, square, angle, tangent, parallel, etc.	839

11. **Speeds.**

Miles per hour	742
Feet per second, revs. per minute, etc.	67
Total	809

Frequency.

12. Graphs. 79



In so far as a comparison of these three studies can be made, that is of the Bobbitt, Boston and Balmain investigations, they appear to agree on all points. The ordinary newspaper reading of the average citizen, does not call for any mathematical or arithmetical operations, and in none of the three studies made, was there found a need for the solution of a mathematical problem, nor any reference to the higher mathematics. Such conclusions, should thus help to set at rest any fears we might have, that in simplifying our mathematical curricula, we are depriving pupils of certain mathematical essentials, unless they are to become specialists in certain fields. In a study made by Wise[4], it was found that,

(i) Arithmetic is surprisingly simple and is the same for rural and city people.

(ii) 85% of all problems classified, involved only the four fundamental operations.

(iii) The fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{3}$, $\frac{2}{3}$, 1/5th, $\frac{1}{8}$ constituted 94% of all fractions.

(iv) Problems involving compound interest, proportion, insurance, painting and bank discount were negligible, and there were none at all on investments, stocks and shares, foreign exchange, complex fractions or troy weight.

This, and other data from recent studies on what is useful in arithmetic, should help those educators who are concerned with framing our curricula, in deciding what to keep and what to reject from old and outmoded syllabuses.

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1. "The Technique of Curriculum Making in Arithmetic," Elem. Sch. Journal, Oct., 1924.
2. "Teaching the New Arithmetic," Wilson, Stone & Dalrymple, 1939.
3. Of the 16,914 fractions, 2/5th occurred 28 times, 1/5th 27 times, 4/5ths 12 times, 3/10ths 6 times, 3/5ths 5 times, 1/10th 3 times. In the Balmain investigation, the percentage of fractions involving halves, quarters and eighths was 89%.
4. Journal of Educational Research, Vol. XLI, Jan., 1948.
5. Recent research on the use of fractions in everyday life by C. Dalrymple, Jour. of Educ. Res. Jan. '37; G. Russell, same journal Ap. '45, and J. Johnson, Mar. '47, may be referred to.